

State of California  
AIR RESOURCES BOARD

EXECUTIVE ORDER D-384  
Relating to Exemptions Under Section 27156  
of the Vehicle Code

ENGELHARD CORPORATION  
CMX CATALYTIC CONVERTER MUFFLER AND  
CCX CATALYTIC CONVERTER

Pursuant to the authority vested in the Air Resources Board (ARB) by Section 27156 of the Vehicle Code; and

Pursuant to the authority vested in the undersigned by Sections 39515 and 39516 of the Health and Safety Code and Executive Order G-45-9;

IT IS ORDERED AND RESOLVED: That the installation of the CMX Catalytic Converter Muffler and CCX Catalytic Converter (CMX/CCX), manufactured by Engelhard Corporation of 101 Wood Avenue, Iselin, New Jersey 08830-0770, has been found not to reduce the effectiveness of the applicable vehicle pollution control system, and therefore, the CMX/CCX converter is exempt from the prohibitions of Section 27156 of the California Vehicle Code for installation on 1990 and older model-year heavy-duty two-stroke diesel-powered engines.

This Executive Order (Order) is valid provided that installation instructions for the device will not recommend tuning the vehicle to specifications different from those submitted by the manufacturer.

Changes made to the design or operating conditions of the device, as exempt by the ARB, which adversely affect the performance of a vehicle's pollution control system shall invalidate this Executive Order.

Marketing of the device using an identification other than that shown in this Executive Order or marketing of the device for an application other than those listed in this Executive Order shall be prohibited unless prior approval is obtained from the ARB.

This Executive Order does not constitute any opinion as to the effect the use of the device may have on any warranty either expressed or implied by the vehicle manufacturer.

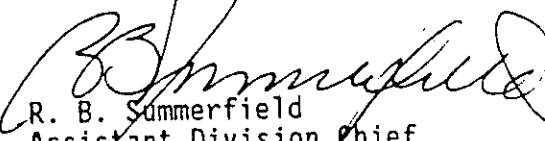
THIS EXECUTIVE ORDER DOES NOT CONSTITUTE A CERTIFICATION, ACCREDITATION, APPROVAL, OR ANY OTHER TYPE OF ENDORSEMENT BY THE AIR RESOURCES BOARD OF ANY CLAIMS OF THE APPLICANT CONCERNING ANTI-POLLUTION BENEFITS OR ANY ALLEGED BENEFITS OF ENGELHARD CORPORATION'S CMX/CCX CONVERTER.

No claim of any kind, such as "Approved by the Air Resources Board", may be made with respect to the action taken herein in any advertising or other oral or written communication.

Violation of any of the above conditions shall be grounds for revocation of this Order. The Order may be revoked only after a ten-day written notice of

intention to revoke the Order, in which period the holder of the Order may request in writing a hearing to contest the proposed revocation. If a hearing is requested, it shall be held within ten days of receipt of the request and the Order may not be revoked until a determination after the hearing that grounds for revocation exist.

Executed at El Monte, California, this 13<sup>th</sup> day of September 1995.

  
R. B. Summerfield  
Assistant Division Chief  
Mobile Source Division

State of California  
AIR RESOURCES BOARD

EVALUATION OF ENGELHARD CORPORATION'S  
CMX CATALYTIC CONVERTER MUFFLER AND  
CCX CATALYTIC CONVERTER  
FOR EXEMPTION FROM THE PROHIBITIONS OF VEHICLE CODE  
SECTION 27156 IN ACCORDANCE WITH SECTION 2222, TITLE 13 OF THE  
CALIFORNIA CODE OF REGULATIONS

September 1995

State of California  
AIR RESOURCES BOARD

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by

Mobile Source Division

State of California  
Air Resources Board  
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(This report has been reviewed by the staff of the California Air Resources Board and approved for publication. Approval does not signify that the contents necessarily reflect the views and policies of the Air Resources Board nor does the mention of trade names or commercial products constitute endorsement or recommendation for use.)

### SUMMARY

Engelhard Corporation (Engelhard) of 101 Wood Avenue, Iselin, New Jersey 08830-0770 has applied for an exemption from the prohibitions of Section 27156 of the California Vehicle Code for their CMX Catalytic Converter Muffler and CCX Catalytic Converter (CMX/CCX). The CMX/CCX converter is designed for installation on 1990 and older model-year heavy-duty two-stroke diesel-powered engines and has been certified by the United States Environmental Protection Agency to meet their requirements for the Urban Bus Retrofit and Rebuild Program.

Emissions data obtained from heavy-duty transient Federal Test Procedure show that the CMX/CCX converter meets the requirements of Section 27156 of the California Vehicle Code and Section 2222, Title 13 of the California Code of Regulations and will not adversely affect the emissions from those engines for which the exemption is requested. The staff recommends that Engelhard be granted an exemption as requested and that Executive Order No. D-384 be issued.

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State of California  
AIR RESOURCES BOARD

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CCX CATALYTIC CONVERTER FOR EXEMPTION FROM THE PROHIBITIONS OF VEHICLE CODE  
SECTION 27156 IN ACCORDANCE WITH SECTION 2222, TITLE 13 OF THE  
CALIFORNIA CODE OF REGULATIONS

I. INTRODUCTION

Engelhard Corporation (Engelhard) of 101 Wood Avenue, Iselin, New Jersey 08830-0770 has applied for an exemption from the prohibitions of Section 27156 of the California Vehicle Code for their CMX Catalytic Converter Muffler and CCX Catalytic Converter (CMX/CCX) for installation on 1990 and older model-year heavy-duty two-stroke diesel-powered engines. Engelhard has submitted the results from heavy-duty transient Federal Test Procedure conducted on a 1985 model-year Detroit Diesel Corporation (DDC) 6V-92TA Mechanical Unit Injection (MUI) engine.

II. CONCLUSION

Engelhard has submitted all the required information, and based on the submitted emissions test data, the staff concludes that CMX/CCX converter does not adversely affect the exhaust emissions from those engines for which the exemption is requested.

III. RECOMMENDATION

The staff recommends that Engelhard be granted an exemption as requested, permitting advertisement, sale and installation of their CMX/CCX converter on 1990 and older model-year heavy-duty two-stroke diesel-powered engines, and that Executive Order No. D-384 be issued.

#### IV. DEVICE DESCRIPTION AND OPERATION

The CMX converter is an integrated catalytic converter muffler designed to replace the original equipment manufacturer muffler. It provides particulate matter emission reduction as well as exhaust noise attenuation. The CCX converter is a converter-only add-on device. Centerbodies of both the CMX and CCX converters are identical in their physical and chemical characteristics. The CMX/CCX converter consists of ceramic monolithic substrates coated with platinum catalyst. All CMX/CCX converter shells are made of 409 stainless steel with the exception of the aluminized steel shell used for the Flexible bus configuration. The CMX/CCX converter shells measure from 9 to 12 inches in diameter and from 18 to 43 inches in length. Engelhard provides different installation kits with the CMX/CCX converters to fit the various two-stroke engines.

#### V. DEVICE EVALUATION AND DISCUSSION

Engelhard has submitted results of emissions testing conducted at Southwest Research Institute located in San Antonio, Texas. The test engine was a federally-certified 1985 model-year DDC 6V-92TA MUI engine. The V-6, two-stroke diesel-powered engine had a 552 cubic inches displacement and has accumulated approximately 300,000 miles of service. Emissions were measured over the heavy-duty transient Federal Test Procedure as set forth in Title 40 Part 86, Subpart N of the Code of Federal Regulations. One baseline transient emission test was conducted on the engine without the CMX/CCX converter. A modified transient emission test was conducted with the CMX/CCX converter installed. The emission test results from the transient tests are shown below:



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Heavy-Duty Transient Federal Test Procedure  
Exhaust Emissions (g/bhp-hr)\*

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	<u>HC</u>	<u>CO</u>	<u>NOx</u>	<u>PM</u>
<u>Baseline:</u>				
Cold-Transient	1.929	3.111	9.629	1.673
Hot-Transient	1.079	2.449	9.540	0.757
Composite**	1.200	2.544	9.553	0.888
<u>Modified:</u>				
Cold-Transient	1.345	2.232	9.804	1.221
Hot-Transient	0.544	1.199	9.688	0.412
Composite**	0.658	1.347	9.705	0.528
<u>Difference Between</u>				
<u>Baseline and Modified:</u>	-0.542	-1.197	+0.152	-0.360
<u>% Difference:</u>	-45.2%	-47.1%	+1.6%	-40.5%

\* grams per brake-horsepower-hour

\*\* one-seventh of cold-transient level and six-seventh of hot-transient level

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The differences between the modified and baseline test results submitted by Engelhard were within the allowed limits of 10 percent hydrocarbon (HC), 15 percent carbon monoxide (CO), 10 percent oxides of nitrogen (NOx), and 15 percent particulate matter (PM) as specified in the "Procedures for Exemption of Add-On and Modified Parts." Since the test engine used was federally-certified, the staff conducted an engineering evaluation of the CMX/CCX converter to determine its emissions impact on California-certified engines.

The catalyst formulation submitted by Engelhard indicates that NOx emissions will not be affected by the catalytic reaction. The emission test results on the federally-certified engine show that HC, CO, and PM emission levels decrease with the use of the CMX/CCX converter while the NOx emission level is unaffected (the slight increase in NOx emission level is attributed to test-to-test variability). The staff believes that similar effect on

emissions will be exhibited if the CMX/CCX converter is used on California-certified engines. Therefore, the staff concludes that the CMX/CCX converter will not have any adverse effect on exhaust emissions of the engines for which an exemption is requested.

Engelhard has submitted all the required information and has fulfilled the requirements for an exemption.